

SCOPES OF THE CLAIMS

[1] A method of manufacturing a micro tunnel-junction circuit, said method comprising the steps of:

forming a three-layer structure by laminating a first metal, an insulator, and a second metal on a substrate in this order;

forming a narrow wall part by milling said three-layer structure in the depth direction by using a focused ion beam; and

forming at least one laterally passed through-hole in said wall part by using the focused ion beam, and forming at least one recessed portion positioned adjacent to said hole by milling the upper surface of said wall part in the depth direction, wherein

said hole is a through-hole starting at the position of the head of the second metal to the position of the head of said substrate, and said recessed portion is formed to be recessed from the upper surface of said wall part into the first metal.

[2] A method of manufacturing a micro tunnel-junction circuit, said method comprising the steps of:

firming a three-layer structure by laminating a first metal, an insulator, and a second metal on a substrate in this order;

forming a narrow wall part by milling said three-layer structure in the depth direction by using a focused ion beam; and

forming a laterally passed through-hole in said wall part by using the focused ion beam, and forming two recessed portions positioned adjacent to said hole so as to sandwich said hole by milling the upper surface of said wall part in the depth direction, wherein

said hole is a through-hole starting at the position of the head of the second metal to the position of the head of said substrate, and said two recessed portions are formed to be recessed from the upper surface of said wall part into the first metal.

[3] The method of manufacturing a micro tunnel-junction circuit according to Claim 2, said method further comprising the step of:

forming a protruded portion by milling said three-layer structure in the depth direction by using the focused ion beam at a position adjacent to said wall and facing said hole and said two recessed portions.

[4] The method of manufacturing a micro tunnel-junction circuit according to any one of Claims 1, 2 and 3, wherein said first metal and said second metal are niobium.

[5] The method of manufacturing a micro tunnel-junction circuit according to Claim 4, wherein

xenon fluoride gas is introduced when processing is performed by using said focused ion beam.

[6] A micro tunnel-junction circuit, comprising:

a narrow wall part made up of a three-layer structure which is formed by laminating a first metal, an insulator, and a second metal on a substrate in this order;

at least one laterally passed through-hole formed in said wall part; and

at least one recessed portion that is formed adjacent to the hole, on the upper surface of said wall part, wherein

said hole is a through-hole starting at the position of the head of the second metal to the position of the head of said substrate, and said recessed portion is formed to be recessed from the upper surface of said wall part into the first metal.

[7] A micro tunnel-junction circuit, comprising:

a narrow wall part made up of a three-layer structure, which is formed by laminating a first metal, an insulator, and a second metal on a substrate in this order;

a laterally passed through-hole formed in said wall part; and

two recessed portions that are formed adjacent to said hole so as to sandwich said hole, on the upper surface of said wall part, wherein

said hole is a through-hole starting at the position of the head of the second metal to the position of the head of said substrate, and said two recessed portions are formed to be recessed from the upper surface of said wall part into the first metal.

[8] The micro tunnel-junction circuit according to Claim 7, further comprising:

a protruded portion that is made up of said three-layer structure, and arranged at a position adjacent to said wall and facing said hole and said two recessed portions.

[9] The micro tunnel-junction circuit according to any one of Claims 6, 7 and 8, wherein

said first metal and said second metal are niobium.